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## SOME STEPS IN THE EVOLUTION OF SOCIAL OCCUPATIONS.

### III.

AS LONG as man was unaided by artificial devices, he was greatly limited in the use of the food materials which were at hand and which later came under his control. Impelled by hunger, he naturally availed himself of those materials which most quickly attracted his attention and which yielded him sufficient nourishment with the least expenditure of labor.

In the choice of foods man was guided by his instincts, by his senses, and by his experiences. Man's sense of taste at that time was a far safer guide than it is at present, since it had not become habituated to the use of artificial flavors. Taste was one of nature's methods of indicating whether a food was beneficial or injurious to the organism. But it was not due so much to taste as to the use of associative memory that man was able to inaugurate a campaign upon his natural environment which has been carried on from that day to this. Associative memory enabled him to take account, not merely of his own personal experiences, but of those of his neighbors. It enabled him, likewise, to take the suggestions afforded by the natural world.

Man's instincts and experiences united in causing him to leave all but the lower forms of animal life undisturbed. He was unable to cope with the larger animals. The fear which they aroused in him was due to an organic strain called forth by an instinctive response to a dangerous situation. For a long time man avoided conflict with the wild beasts and helped himself to their products and stores in an unobtrusive way.

Previous to the conquest of fire, it was the vegetable world, rather than the animal, that supplied man with the larger part of his food supplies. Only gradually was he able to increase the sources of his subsistence beyond the most conspicuous plants, which, fortunately, were also the most useful ones. Succulent

stems and leaves, fruits, berries, buds, blossoms, thin-shelled nuts, and even the tender bark of trees—all these were made use of by man in his most feeble state. Shoots of the wild asparagus, stalks of celery, tender twigs of oak trees, leaves of the cabbage, the watercress, and lettuce were easily appropriated and furnished man with valuable nutrients. Wild peas and beans were gathered from the hillsides where they grew, and were eaten in the green pod just as children in country districts eat green peas today. Spots that furnished wild berries, apples, pears, and plums were resorted to at the proper season, though they were often eaten when green, or even in the bud. The custom of eating green fruit was not due to scarcity alone. It was a habit formed to meet the demand of the organism for potassium salts, which are more abundant in green fruits than in ripe ones. All these natural foods were eaten on the spot where they were found, except when a sign of danger prompted man to bear such as he could seize quickly and carry to a safe place of retreat. Since the hands were not yet free from the function of locomotion, it was necessary for man to make use of his teeth, his toes, or his arm pressed against his side in carrying objects. A sufficient motive to call forth the invention of the basket or of a device for attaching the burden to the body was not present until after the conquest of fire.

But man cannot live on vegetable foods alone. Such foods do not contain a sufficient amount of salt (*sodium chloride*) to satisfy the demands of his organism. Until man learned to find salt in its pure state he was obliged to satisfy his instinctive craving for it by seeking for foods in which it is found. Animal foods, pre-eminently, are those that are rich in salt. Accordingly, from the earliest times man availed himself of such animal foods as he was able to appropriate. For a long time these consisted chiefly of such forms as the larvæ of beetles, the pupæ of ants, butterflies, caterpillars, spiders, snakes, lizards, young birds, squirrels, rabbits, turtles, frogs, and, in short, of any form which he was able to overpower.

Man not only availed himself of the flesh of animals, but he helped himself to their products and stores of food. The eggs

of birds, the honey of bees, nuts stored away by the squirrel and woodpecker, the bone buried by the wolf—all contributed from time to time toward satisfying the pangs of hunger. For many reasons honey was a very acceptable food at this time. Its flavor offered an agreeable contrast to the prevailing bitter taste of a majority of the wild plant-foods. The active life that characterized the period made a demand for a large amount of heat and muscular energy, which, owing to the scarcity of available fats, was supplied in part by the use of honey. The ease with which it was digested operated with other causes in making it much sought after by the river-drift man. Of manufactured sugars there were none at this time. Aside from honey man found natural sweets first, when he was an infant, in his mother's milk. Later he found them in the fully ripened fruits and berries, in the stems and roots of grasses, in the beet, the turnip, the rutabaga, and the carrot. The absence of the sugar maple and the sugar cane from Western Europe during the mid-Pleistocene period did not permit man to utilize their sap in supplying his craving for sweets. Plants rich in starch, to be sure, supplied man with sugar, but the burden of manufacturing the starch into sugar was placed upon the digestive system.

The seeds as well as the fleshy portions of the pumpkin, the squash, vegetable marrow, the muskmelon, the watermelon, the cucumber, and other varieties of gourds were undoubtedly eaten, their hard shells furnishing the first drinking-vessels of man. Water was the chief beverage of the river-drift man, though it was probably supplemented by the warm blood of such animals as he was able to capture. Fresh water was found in springs, in lakes, in running brooks and rivers. Man drank at first by direct contact of the lips with the natural supply or by using the hollow of his hand for a dipper. But gradually the shells of gourds, horns, or other natural forms were used as drinking-cups. Since man at this time had no means of carrying water, he never went far from a natural source of supply. In his wanderings he was no doubt guided by the presence of animals that habitually resort to a natural drinking-place each day.

It is probable that man as well as the animals instinctively

sought plants possessing medicinal or stimulating properties, and that, as he found in them the means of increasing his strength and courage, he resorted at frequent intervals to the spots where they grew. The mild stimulus thus received undoubtedly was of value as a means of accelerating human progress.

Probably man first learned to enlarge the sources of his subsistence through the observation of the habits of the grass-eating animals. The succulent bulbs and roots firmly imbedded in the soil were less conspicuous and more difficult to procure than berries, fruits, and succulent stems and leaves. But they constituted an important element in the food of the wild hogs, and by observing these creatures as they rooted up and devoured the turnip, the rutabaga, and the wild carrot, man was stimulated to take the suggestion they offered. At first, no doubt, he pulled these roots up by their tops or dug them up with his fingers. But the difficulty encountered in procuring the larger roots unaided by artificial devices of any kind was sufficient to stimulate man to devise an easier way, and the digging-stick thus appeared. For a long time it consisted of the most available natural form that could be found upon the spot, for the *use of natural forms* always precedes the *manufacture* of tools or implements of any kind. A branch with a sharp point, a long bone, a horn, or any other natural object that could supplement the use of the hands and enable man to apply his energy more advantageously than before, constituted the digging-stick—the most primitive form of a large class of implements which are now used in cultivating the soil. Although the wild parsnip was present, it was not suited to human consumption, for in the wild state it contains a poisonous principle, which the river-drift man had not learned to remove. All the wild roots were more pungent and disagreeable to the taste than the cultivated forms with which we are familiar; but man was so occupied with the problem of procuring a sufficient amount of nourishment that he had no time to devote to ways of rendering foods more palatable.

Among the several varieties of edible fungi, the mushroom was the most easily obtained. Not until the habits of the wild hogs were observed did man discover where the truffles grew;

for there was nothing upon the ground to indicate their presence. But by watching the wild hogs as they rooted under the oak trees, man learned where to look for them; and, remembering this fact, he was able to procure them when the wild hogs left the spot.

The acorns, which furnished a valuable food for the wild hogs, were too bitter and too difficult to digest to recommend themselves for human food, except in cases of extreme necessity. Later, when man learned to remove the bitter flavor and to grind them into a flour that was more easily digested, they formed an important food material; but the bitter varieties native to western Europe were not well adapted to the use of the river-drift man. It was different, however, in the case of the hazelnuts, beechnuts, and walnuts. Though their kernels were imprisoned in hard shells, man early learned to crack them with his teeth. The difficulty presented in the case of the large nuts with thick shells stimulated man to devise artificial ways of cracking them. The use of the smooth stone as a hammer undoubtedly arose in the first instance from the need of cracking hard nuts. The use of the hammer-stone not merely served to extend the number of foods upon which man might draw, but it lightened the burden placed upon the teeth in cracking hard shells, and, in so far as it was used in crushing the harder varieties of food, it lightened the mechanical part of digestion. It is not probable, however, that any but the faintest beginnings were made in the process of crushing food during this period.

No mechanical invention of the period was more significant with reference to the enlargement of the sources of subsistence than that of the stone hunting-knife. Very likely natural forms of wood, bone, or horn had been used as knives before; but the pebble, chipped at one end so as to have a sharp point, is a distinct advance in man's method of life. It represents a greater control of environment than had appeared before. It bears witness to the fact that man was no longer content with the mere use of natural forms, and that he began in that early age the work of modifying such forms to suit his purposes. Whether the hunting-knife was suggested by the use of natural forms, by the breaking

of the hammer-stone, or by some other process, is not recorded. Very likely all these processes contributed to its invention. By its use man greatly increased his power in procuring nourishing food of various kinds. Armed with this crude weapon, man was better able to hunt the small animals than he had been before. He could use it in removing the skins of animals and in hacking off strips of raw flesh, as well as in reducing to more convenient form many of the larger plant foods which he used. The crude hunting-knife, the hammer-stone, and the digging-stick constitute the important mechanical inventions of this period. They served to enlarge the sources of subsistence, to lighten the burden placed upon the body in procuring foods, and they offered a suggestion, at least, of ways of lightening the work of digestion.

But the invention most significant for this period, if not for all time, was the conquest of fire. By offering man protection from the wild beasts, it allowed him to save energy which previously had been expended in escaping from wild beasts. The energy thus saved would have enabled man to live as well as he had before with much less effort. But the opportunity to advance was made use of, and the surplus energy was expended in ways fundamental with reference to future times.

The common life that developed with the use of fire involved a co-operation and a division of labor impossible before. All felt the need of preserving the fire; and since no one had yet learned how to make it, the women who had young children stayed near and kept it burning, searching for such wild foods as they could find near by, while the men, and the women not burdened with young children, exploited more distant regions. For a long time people followed their old habits, each searching for his own food; but the common life around the fireside at night, where the personal adventures of the day were recounted or acted out by means of gesture and pantomime, suggested other modes of co-operation. The hunting-dance, which was developed during leisure hours, was an expression of the store of surplus energy made possible by the advantages resulting from the use of fire. That this energy should be discharged along lines marked out by the prac-

tical activities of everyday life was inevitable. That its expression should be modified so as to lend itself to the accomplishment of purposes hitherto beyond the possibility of achievement was one of the many instances that reveal the method by which the race has advanced from the humblest beginnings to its present state.

It may have been the use of the firebrand as a means of protection in the search for food that suggested its use in hunting the small animals that burrow in the ground. At any rate, man early learned to chase these small creatures to their burrows and to smoke them out by the use of fire, whereupon he quickly dispatched them by means of a club. The fact that an animal sometimes escaped served to make man more conscious of the need of assistance; and, gradually, two or more persons united in hunting small animals in this way. But it was the larger animals that aroused the strongest motive for co-operative action. They were a constant source of terror. Little was accomplished during this period, however, in the warfare waged upon them; and since this warfare constitutes a characteristic feature of the next two epochs, this phase of the subject will be treated in connection with the occupations of those periods.

The use of fire as a means of cooking was probably not noticed during the period of the river-drift man. It is probable, however, that foods were cooked accidentally at this time; but man's attention, being so fully occupied with problems more vital to the age, was not attracted so as to perceive the significance of such accidental phenomena.

The processes of production and consumption during this period were not separated by an interval of time. The activities involved consisted of a great variety of human movements. The motive power in all cases was furnished by the human body whose physical co-ordinations set the pattern for the mechanical inventions of all times. The phase of the process that may be termed "production" consisted of the exploitation of environment in search of those plants and animals upon which man could lay tribute. The manufacturing art consisted, first, in the direct use of the organs of the body in reducing food materials to a form



suited to the action of the digestive tracts, which at this time performed many of the mechanical and chemical processes now relegated to machinery and the action of heat, as well as the labor involved in disposing of a large amount of refuse matter; second, in the selection and use of natural forms by means of which to supplement the efficiency of the organs of the body; third, in a slight modification of natural forms for the sake of still further increasing their efficiency; and, fourth, in the conquest and use of fire, by means of which man greatly increased his power to secure nourishing food, and which he later learned to apply to other processes as well. The beginnings of distribution were involved in the habit of resorting to the spots where desirable food materials were found, for it was not until a much later date that foods were carried to a place removed from the spot where they were procured. Although man made no conscious effort to preserve foods at this time, he made use of the foods preserved and stored by nature's processes. The processes of consumption were largely automatic. There was no dressing of materials, no cooking, no serving, no companionship in sharing food. The digestive system was so taxed by the burden since handed over to the manufacturing processes that it was unable to derive all the nutrients from the foods consumed. In so far as there was a conscious rejection of the most conspicuous refuse, there was a beginning made in sifting and cleaning food. In so far as there was a conscious selection of ripe fruits and vegetables in preference to green and half-grown products, there was an instinctive recognition of the value of the natural cooking which was effected by the sun's rays.

The mechanical appliances of the period were implicit in man himself and were used chiefly in an automatic way. Only as they were perceived to be inadequate did they become the subject of conscious attention. Then man sought in various ways to supplement his weakness and to apply his power in the most advantageous way. The digging-stick, the hammer, and the hunting-knife thus appeared as means of reinforcing the work of the nails and the teeth. These tools were used for a variety of

purposes, for the special interests which called forth specialized tools were a product of a much more advanced stage of culture.

The period as a whole is characterized, not by *making*, but by *finding* and *using* what is at hand. Many of the processes which have since become conscious and been relegated to complicated machinery, during this period, were performed within man's body in an unconscious way. From one point of view the evolution of social occupations is an account of the way in which the processes which formerly took place within the body in an unconscious way have been handed over to machinery.

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